

Yaroslav Ryabov

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INFORMATION	Home phone: 301-255-0490	Fax: 301-480-0028
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RESEARCH INTERESTS	Computer modeling of protein dynamics, applications of NMR spectroscopy to structural biology, inter- and intra-domain dynamics in multi-domain protein systems, bioinformatics and genetics.	
OTHER RESEARCH FIELDS	Simulations of electromagnetic wave propagation in living tissue, theory of relaxation and transport in soft-condensed matter, dielectric properties of soft-condensed matter, glass-forming liquids, polymers and biopolymers, time domain and broadband frequency domain dielectric spectroscopy, theory of dielectric relaxation, fractional calculus and fluid dynamics.	
PROFESSIONAL POSITIONS	National Institutes of Health , Bethesda, Maryland, USA 2007 - present <i>NRC fellow, Center for Information Technology, Division of Computational Bioscience</i> Derived new structural restraints for overall protein shape from protein rotation dynamics implemented into Xplor-NIH.	
	Purdue University , West Lafayette, Indiana, USA 2006 - 2007 <i>Postdoctoral Research Associate, Department of Chemistry</i> Developed a model of random quasi-evolutionary process, which explains statistics of exon size distribution in real genomes and reveals two distinctive classes of exons with different evolutionary history. Suggested a new method for accurate accounting of protein rotation diffusion in Molecular Dynamics trajectories. Designed a new type of electrophoretic gels with colored stacking parts.	
	University of Maryland , College Park, Maryland, USA 2003 - 2006 <i>Postdoctoral Research Associate, Center for Biomolecular Structure and Organization</i> Developed a new, efficient and fast computational approach for evaluation of protein rotation diffusion tensors, which is 500 times faster than conventional HYDRONMR family programs. Suggested a new concept of assembling multi-domain protein structures using experimentally measured components of diffusion tensors as constraints for protein structure elucidation. Developed a method for characterization of inter-domain mobility in multi-domain proteins using NMR relaxation and residual dipolar coupling data. In application to a two-domain di-ubiquitin protein, the method revealed dynamic equilibrium between three distinctive conformation states of the molecule, which are controlled by the charge state of Histidine residue.	
	The Hebrew University , Jerusalem, Israel 1999 - 2003 <i>Postdoctoral Research Associate, School of applied science, Laboratory of Dielectric spectroscopy</i> Proposed the model of non-monotonous relaxation kinetics in confined systems. The model found numerous applications for porous samples, like silica-glasses and porous silicon, polymer micro-composites, confined liquid crystals, and folding kinetics of biopolymers. Created frameworks for explanation of symmetric and asymmetric broadening of dielectric relaxation spectra, which opened the possibility of characterizing conformation states of polymer molecules in micro-composites, melts and solutions using dielectric spectroscopy. Investigated and analyzed relaxation behavior of mixtures of associated liquids for the model system of glycerol/water mixtures in the whole range of mixture compositions and extremely wide-frequency band and temperature intervals. Discovered universal behavior of associated mixtures caused by formation of joint dynamic	

clusters of glycerol and water molecules.

For the first time characterized relaxation behavior of the glycerol crystalline phase.

Conducted numerical calculations of penetration of electromagnetic waves into living tissue.

Created a model of polarization and interaction between cloud droplets with the purpose of evaluating the effect of electrostatic charges on cloud microphysics.

Investigated theoretical aspects of *Fractional Calculus* in application to dissipative problems.

Analyzed asymptotic behavior of two different formulations of anomalous diffusion problem.

Institute for Mechanics and Engineering

1996 - 1999

Kazan Scientific Center, Russian Academy of Sciences, Kazan, Russia

Research Associate

Laboratory of Underground Hydrodynamics

Studied theoretical aspects of multi-component filtration in porous and fractured reservoirs.

Investigated the effect of harmonic pressure waves on commercial oil production.

The Hebrew University, Jerusalem, Israel

12/1997 – 03/1998

Visiting Scientist, School of Applied Science, Laboratory of Dielectric spectroscopy

Created a model of relaxation and dynamic percolation in micro-emulsion systems.

EDUCATION

Kazan State University, Kazan, Russia

Ph.D. in Theoretical Physics

12/1996

Thesis: “Relaxation and transport processes in self similar media”

Advisor: Professor R. R. Nigmatullin

M.S. in Theoretical Physics

05/1993

Thesis: “Investigation of nonexponential relaxation law of luminescence”

Advisor: Professor R. R. Nigmatullin

RECOGNITION

National Research Council Research Award

2007 / 2008

Research associateship at the *National Institutes of Health, Center for Information Technology, Division of Computational Bioscience*

Invited Publication

2006

in special issue on *Fractals, Diffusion and Relaxation in Disordered Complex Systems* of *Advances in Chemical Physics Series, Chapter 1*

Invited Publication

2002

in special issue on *Strange Kinetics* of *Chemical Physics* journal

Invited Publication

2002

in contributed volume *Scaling and Disordered Systems*

Travel award Gordon Research Conference “Water and Aqueous Solutions”

08 / 2002

The Lady Davis Fellowship for postdoctoral research

1999 – 2001

in The Hebrew University of Jerusalem, Israel

Cover Story in interdisciplinary scientific journal “Priroda” (in Russian)

2 / 1998

PUBLICATIONS

Thirty-six peer-reviewed journal papers in *Journal of the American Chemical Society, Nucleic Acids Research, Physical Review B, Physical Review E, The Journal of Chemical Physics, Journal of Physical Chemistry B, Proteins, Physica A, Journal of Non-Crystalline Solids, IEEE transactions* and others; the first author in **twenty** peer-reviewed journal papers; **six** invited lectures; **three** invited publications in special journal issues devoted to problems of the glass-forming state and strange kinetics phenomena, including *Chapter 1 for Special Issue of Advances in Chemical Physics Series*, 2006, John Wiley & Sons, Inc.; **four** patents; **eleven** papers in conference proceedings volumes; **seven** oral talks and **twenty-four** poster presentations.

TEACHING	Statistical Mechanics , over 100 students	1999
	Department of Physics, Zelenodolsk Campus, Kazan State University, Russia	
	Classical Mechanics II , over 100 students	1999
	Department of Physics, Zelenodolsk Campus, Kazan State University, Russia	
	Classical Mechanics I , over 20 students	1994
	Department of Physics, Kazan State University, Russia	
ADDITIONAL INFORMATION	Advanced Physics for gifted high school students ,	1992 - 1998
	Preparatory School for University Applicants, Department of Physics, Kazan State University, Russia	
	Advanced Mathematics for gifted high school students ,	1992 - 1998
	Preparatory School for University Applicants, Department of Physics, Kazan State University, Russia	
	<i>Computer Skills</i> : C/C++, MATLAB, Pascal, Python, Xplor-NIH, Fortran77/90/95, LaTeX, Windows, Linux	
	<i>Languages</i> : fluent in English, native Russian	
REFERENCES	<i>Citizenship</i> : Russian Federation,	
	U.S. permanent resident status given on the basis of extraordinary abilities.	
Available upon request		